Replaced by Art. 34

setup of the communication between data concentrators (D1…D2) and measuring heads (M1…M7), is provided.

16. The device as claimed in one of claims 11 to 15, characterized in that at least one measuring head (M1…M7), which is connected to a signal generator which supplies a standardized time signal, is provided.

17. The device as claimed in claim 16, characterized in that at least one of the measuring heads described in the characterizing part of claim 16 is mounted on the upper termination of a device within which, or by means of which, the industrial process is carried out.

18. The device as claimed in one of claims 11 to 17, characterized in that at least one programmable evaluation unit (E1…E2) is provided, it being possible for the programmable evaluation unit (E1…E2) to be located at any desired spatial distance from the partial processes (T1…T2).

19. The device as claimed in one of claims 11 to 18, characterized in that at least one display unit (A1…A2) is provided for displaying data which is generated from the measuring signals and/or time signals, it being possible for the display unit (A1…A2) to be located at any desired spatial distance from the partial processes (T1…T2).

20. The device as claimed in one of claims 11 to 19, characterized in that the data concentrators (D1…D2) are conditioned so as to be capable of being expanded in such a way that the respectively required number of measuring bus systems (B1…B2) and/or measuring heads (M1…M7) can be connected to them.

Patent Claims

1. A method for acquiring and processing signals from industrial processes which are composed of at least one partial process (T1…T2), the industrial process being controlled and/or regulated by at least one automation device which is equipped with one or more bus systems, characterized in that

a) at least one measuring bus system (B1…B2) is used which is not identical to the bus system or the bus systems of the automation device,

b) measuring signals are acquired using at least one measuring head (M1…M6), the measuring head (M1…M6) acquiring measuring signals at the input end from signal generators (S1…S6) of the industrial process which are present and/or which are to be additionally provided and passing on these measuring signals at the output end to the measuring bus system (B1…B2) in a predefined form, and in that

c) the measuring signals are further processed by at least one data concentrator (D1…D2).

2. The method as claimed in claim 1, characterized in that at least one measuring head (M7) receives, at the input end, measuring signals from any desired bus system (P2).

3. The method as claimed in one of the preceding claims, characterized in that at least one measuring head passes on measuring signals directly to a data concentrator (D1…D2) at the output end.

4. The method as claimed in one of the preceding claims, characterized in that measuring heads (M1…M7) and/or data concentrators (D1…D2) are detected automatically.

5. The method as claimed in one of the preceding claims, characterized in that the setup of the communication between data concentrators (D1…D2) and measuring heads (M1…M7) is carried out automatically using at least one communications unit.

6. The method as claimed in one of the preceding claims, characterized in that all the time signals are generated by providing measuring signals with a time stamp.

7. The method as claimed in one of the preceding claims, characterized in that at least one measuring head (M1…M7) receives a standardized time signal.

8. The method as claimed in claim 7, characterized in that the standardized time signal is acquired from a Global Positioning System (GPS).

9. The method as claimed in one of the preceding claims, characterized in that the time signals and/or measuring signals which originate from at least one data concentrator (D1…D2) are processed using at least one programmable evaluation unit (E1…E2), it being possible for the programmable evaluation unit (E1…E2) to be located at any desired spatial distance from the partial processes (T1…T2).

10. The method as claimed in one of the preceding claims, characterized in that at least one display unit (A1…A2) is used to display data which is generated from the measuring signals and/or time signals, it being possible for the display unit (A1…A2) to be located at any desired spatial distance from the partial processes (T1…T2).

11. A device for acquiring and processing signals from industrial processes which are composed of at least one partial process (T1...T2), the industrial process being controlled and/or regulated by at least one automation device which is equipped with one or more bus systems, characterized in that

a) at least one measuring bus system (B1...B2) is provided which is not identical to the bus system or the bus systems of the automation device,

b) at least one measuring head (M1...M6) for acquiring measuring signals is provided and is connected at the input end to signal generators (S1...S6) of the industrial process which are present and/or which are to be additionally provided, and at the output end passes on signals in a predefined form to the measuring bus system (B1...B2), and in that

c) one or more data concentrators (D1...D2) are connected to the measuring bus system (B1...B2).

12. The device as claimed in claim 11, characterized in that at least one measuring head (M7), which is connected at the input end to any desired bus system (P2), is provided.

13. The device as claimed in claim 11 or 12, characterized in that at least one measuring head, which is directly connected at the output end to a data concentrator (D1...D2), is provided.

14. The device as claimed in one of claims 11 to 13, characterized in that means are provided for automatically detecting measuring heads (M1...M7) and/or data concentrators (D1...D2).

15. The device as claimed in one of claims 11 to 14, characterized in that a communications unit, which permits the automatic

spatial independence of the display unit from the industrial partial processes also permits functionalities such as remote analysis and as a result increases both the efficiency and economic viability of the intellectual evaluation of measuring results and makes it significantly easier to use expert knowledge for evaluation.

The method according to the invention can be carried out by means of a device for acquiring and processing signals from industrial processes which are composed of at least one partial process, the industrial process being controlled and/or regulated by at least one automation device which is equipped with one or more bus systems. The device according to the invention is characterized in that at least one measuring bus system is provided which is not identical to the bus system or systems of the automation device, and in that at least one measuring head for acquiring measuring signals is provided and is connected at the input end to signal generators of the industrial process which are present and/or which are to be additionally provided, and at the output end passes on signals in a predefined form to the measuring bus system, and in that one or more data concentrators are connected to the measuring bus system.

Advantageous refinements of the device are described in the subclaims. The advantages emerge in an analogous fashion to those specified in the method claims.

In one advantageous configuration of the device according to the invention, at least one measuring head, which is connected to a signal generator which supplies a standardized time signal, is mounted on the upper termination of a device within which, or by means of which, the industrial process is carried out. This mounting permits improved reception of the standardized time signal if the latter is transmitted in a wire free

fashion, in particular using transmission means which are not exclusively

as well as ease of operation, comparable with the "plug and play" principle, are expected from a corresponding device.

Especially if the individual partial processes of an industrial process are spatially distributed over a wide area, methods and devices for acquiring and processing signals from industrial processes are known which are implemented by means of individual, different partial methods and devices with respectively different performance spectrums and characteristics or by integration into existing control systems, or both. There is no overall system known which is composed of a uniform and modular device which satisfies the previously specified requirements and which also permits synchronous and largely reaction-free acquisition of the signals present in the equipment. Methods for acquiring and processing signals from industrial processes in industrial equipment which is preferably spatially distributed over a wide area and which fulfills all the requirements mentioned above, and also is both capable of being used easily and universally and ensures precise, very largely reaction-free and synchronous acquisition of signals, are also not known.

The object of the invention is to make available a method and a device for acquiring and processing signals from industrial processes in such a way that both the indicated requirements are fulfilled and the aforesaid disadvantages are avoided.

This object is achieved according to the invention by means of a method of the type mentioned at the beginning having the method steps specified in the characterizing part of patent claim 1, and by means of a device having the features specified in the characterizing part of the device according to patent claim 11.

The method according to the invention and the corresponding device are of uniform and modular design. The concept on which the invention is based is to separate measurement and analysis on the one hand, and control and regulation on the other. In particular, the implementation of this concept permits very largely reaction-free acquisition of signals and the implementation of a uniform system of the type mentioned at the beginning which can be used in various ways, is high in power and can be expanded in a modular and cost-effective way.

In one preferred embodiment of the method according to the invention, at least one measuring head receives, at the input end, measuring signals from any desired bus system. As a result, the very largely reaction-free reception of the signals which are exchanged via the bus system and/or the analysis of signal faults on the bus system itself are made possible.

The method according to the invention can advantageously be configured in such a way that at least one measuring head passes on measuring signals directly to a data concentrator at the output end, as a result of which the modularity of the system according to the invention is further increased.

According to a further advantageous configuration of the invention according to patent claim 4, the measuring heads and/or data concentrators are detected automatically. According to one advantageous configuration of the invention according to patent claim 5, the setup of the communication between data concentrators and measuring heads is carried out automatically using at least one communication unit. Both configurations decisively increase the modularity of the method which in this way can be expanded very easily and at low cost and complexity.

In one preferred embodiment of the method according to the invention, time signals are generated by providing measuring signals with a time stamp. As a result,